

C1  
123. (New) The imaging device according to claim 39, further comprising a gate stack over said substrate and beneath said insulating layer.

B1  
124. (New) The imaging device according to claim 53, further comprising a gate stack over said substrate and beneath said insulating layer.

### REMARKS

Reconsideration and allowance of the application are respectfully requested in light of the foregoing amendments and the following remarks.

In response to the Patent and Trademark Office's request, applicant will designate Figures 1, 2 and 3 with the legend "PRIOR ART."

Claims 1-66 are pending in the application. Claims 66-70 were withdrawn from consideration. Claims 30, 40 and 64 have been cancelled herein.

Claims 14, 28 and 39 have been amended in response to the rejection under 35 U.S.C. §112, second paragraph, discussed *infra*. More specifically, in claim 14 "said" has now been replaced with "a". In claim 28 the relationship between the "active pixel sensor", "photogate" and "charge collection area" has now been specified. Claim 39 is now differentiated from claim 28.

New claims 115-124 are directed to additional embodiments of the invention. Support for claims 115-119 is taken from the specification, *inter alia*, at page 17, line 29 to page 18, lines 1-2, while support for claims 120-124 may be found on page 15, lines 29-30 to page 16, lines 1-3.

Entry of the foregoing amendments and new claims is respectfully requested.

Claim 66 was rejected under 35 U.S.C. §112, first paragraph. The Office stated that the “processor” of claim 53 for particular use in a “camera” system is unclear from the specification. In response, applicants submit that the camera system would be one, for example, in which a photoimage is processed through the structure of the claimed invention, and then typically downloaded to a display monitor such as a video screen. The video screen would then relay final prints of the image for distribution, or allow the consumer to edit the image before printing. Based on the foregoing, withdrawal of the §112 rejection is respectfully requested.

As noted above, Claims 14-52 and 64 were rejected under 35 U.S.C. §112, second paragraph. Based on the foregoing amendments and the cancellation of claim 64, withdrawal of the rejection is respectfully urged.

Claims 1-3, 5-7, 12, 15-19, 24-26, 28-33, 38-44, 46, 51, 53-55, 57-59 and 64-66 were rejected under 35 U.S.C. §103 as being obvious over Figures 1-2 and pages 1-12 of the application, together with Nagasaki et al., U.S. Patent No. 5,307,169. This rejection is respectfully traversed for the following reasons.

Nagasaki et al. relates to a solid-state imaging device. It is respectfully submitted that this reference would not have led the skilled artisan to a nitrogen containing insulative layer. Instead, the reference specifically excludes silicon nitride by specifying that the insulative layer “4” contain “high” dielectric material. In this regard, the PTO’s attention is directed to column 3, lines 25-30 and TABLE 1 of the cited reference. There the patentees state that “high” dielectric material includes material with a dielectric constant “of 20 or more.” A laundry listing of several compounds is then provided, none of which contain any nitrogen. Silicon nitride ( $\text{Si}_3\text{N}_4$ ), in contrast, is instead noted as having a “low” dielectric constant of only 10. Thus, Nagasaki et al. unequivocally teaches away from the claimed invention. For at least these reasons, Nagasaki et al. can not form

the basis for an obviousness rejection, and therefore withdrawal of the rejection is respectfully urged.

Claims 4, 27, 45 and 56 were rejected under 35 U.S.C. §103 as being obvious over alleged parts of the pending application together with Nagasaki et al., when further combined with Koike et al., U.S. Patent No. 4,143,389. This rejection is also respectfully traversed.

Koike et al. does not remedy the significant deficiencies associated with the cited Nagasaki et al. reference. In particular, Koike et al. refers to an “insulating oxide film” for use as part of a solid-state image pickup device. Once again, no hint, teaching or suggestion is made within the reference to utilize any nitrogen-containing material in the insulating layer. It is therefore respectfully submitted that the skilled artisan would not have been moved closer to the claimed invention after exposure to the teachings of Koike et al. Thus, even the *combination* of the aforecited references fails to render obvious what has been claimed herein. Withdrawal of the §103 rejection is accordingly respectfully urged.

Claims 8, 10, 11, 20, 22, 23, 34, 36, 37, 47, 49, 50, 60, 62 and 63 were rejected under 35 U.S.C. §103 as being unpatentable over alleged parts of the pending application together with Nagasaki et al., when further combined with Suzuki, U.S. Patent No. 4,385,307. This rejection is also respectfully traversed.

Suzuki, like Koike et al., does nothing to advance the state of the art embodied in the Nagasaki et al. reference. Suzuki teaches to “bury” electrodes within an insulating film that is comprised of pure silicon oxide *or* a composite of silicon nitride with silicon oxide. Suzuki thus treats these materials as merely interchangeable. There is no teaching whatsoever that silicon oxide material by itself does not form an insulating film with acceptable electrical characteristics. Therefore the combination of the previously cited disclosures together with Suzuki would still have been woefully inadequate in directing the

person skilled in the art to what the present applicant has recited. For at least these reasons, it is respectfully submitted that this combination of the cited references is improper, and therefore the rejection should be withdrawn.

Finally, Claims 8, 9, 13, 20, 21, 34, 35, 47, 48, 52, 60 and 61 were rejected under 35 U.S.C. §103 as being obvious over alleged parts of the present application together with Nagasaki et al., when further combined with Okada et al., U.S. Patent No. 5,241,198. This rejection is also respectfully traversed.

The combination of Nagasaki et al. with Okada et al. is especially troublesome. The Office has cited the latter reference for its alleged teachings regarding an "ONO" layer, i.e. oxide-nitride-oxide layer. In contrast, Nagasaki et al. is quite explicit in excluding both silicon oxide and nitrogen-based films from its laundry listing of possible insulative materials. The patentees make it clear that a compound such as  $\text{Si}_3\text{N}_4$  is a "low" dielectric material and is therefore not suitable as a "high" dielectric insulating film. Thus, it is respectfully submitted that combining the disclosure of Nagasaki et al. with that of Nagasaki et al. would only destroy the very foundation of the Nagasaki et al. reference. Nagasaki et al. does not want nitrogen containing compounds in their insulating films. Forcing an "ONO" layer onto the semiconductor substrate of Nagasaki et al. would therefore debase the patent's entire disclosure. Further in this regard, the PTO will note that even the secondary insulative layer "22" of Nagasaki et al. is described as merely as  $\text{SiO}_2$  material. Once again, there is no mention of nitrogen-containing compounds for use as insulative materials. It is respectfully submitted that the two disclosures are incompatible and can not sustain a *prima facie* case of obviousness. For at least these reasons, it is respectfully urged that the rejection based on the combination of Nagasaki et al. and Okada et al. references is improper and should be withdrawn.


In addition, it is further submitted that none of the cited references, either alone or in combination with one another, teach or suggest the features which are set forth in applicant's newly added claims. None show any appreciation for a semiconductor device

in which a nitrogen-containing insulative layer has been etched back wherever it is not covered, and therefore protected by the overlaid conductive layer or photogate. Moreover, there is no appreciation of a gate stack upon which an insulative layer and then a conductive layer are built. Okada et al., for example, is especially deficient in this regard. The cited patent makes reference to an "ONO" layer, but this layer is superimposed *under* the gate electrode "58". In addition, the patentees teach to overlay the gate electrode with pure silicon oxide material. This material not only covers the electrode, but also separates it from the other electrode "60". There is no teaching of a device in which a nitrogen containing insulative layer is over a substrate and beneath a photogate. In conclusion, it is respectfully submitted that applicant's claims recite several features which have not been suggested by the art.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested

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Respectfully submitted,

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